CLAIMS

We claim:

1. A wireless communication system comprising:

a base station with an antenna;

a translator system having as an input first RF signals located in a first wireless communication frequency band and having as an output second RF signals located in a second wireless communication frequency band;

the antenna coupled for transceiving the second RF signals associated with the translator system;

a remote antenna system including a remote antenna for transceiving the second RF signals associated with the base station, the remote antenna system including a translator system having as an input the second RF signals, and operable to output RF signals located in the first wireless communication frequency band.

2. The wireless communication system of claim 1 wherein the remote antenna system further comprises a distribution antenna coupled to the translator system for transceiving the RF signals of the remote antenna system located in the first wireless communication frequency band.

3. The wireless communication system of claim 1 wherein said first and second wireless communication frequency bands are predetermined bands of a frequency spectrum allocated by an authorized entity for wireless communications.

4. The wireless communication system of claim 1 wherein at least one of said first and second wireless communication frequency bands are selected from a group of bands comprising: Cellular 800, DCS 900, unlicensed 900, DCS 1800, PCS 1900, unlicensed PCS, UMTS 1900, UMTS 2100, MDS 2100, MMDS 2500, WCS 2300, unlicensed 2400, MMDS 3500, UNII 5.1 GHz, unlicensed UNII 5.1 GHz, UNII 5.8 GHz, unlicensed UNII 5.8 GHz, and LMDS.

5. The wireless communication system of claim 1 wherein the first wireless communication frequency band is a PCS band and the second wireless communication frequency band is an MMDS band.

6. The wireless communications system of claim 1 wherein said remote antenna system is incorporated within a picocell and propagates

the signals in the first wireless communication frequency band in an area bounded by said picocell.

7. The wireless communication system of claim 1 wherein the translator associated with the remote antenna system is located inside a building.

8. The wireless communication system of claim 1 wherein the remote antenna system is located inside a building.

9. The wireless communication system of claim 1 wherein the signals in the first wireless communication frequency band output by the remote antenna system are configured to be used by customer premises equipment.

10. The wireless communication system of claim 1 wherein said remote antenna includes multiple arrays of antenna elements for defining multiple beams for the remote antenna.

11. The wireless communication system of claim 1 wherein said remote antenna system is also operable to provide, as an output, the second RF signals in the second wireless communication frequency band.

12. The wireless communication system of claim 1 wherein said remote antenna system includes a wireless hub for communicating with customer premises equipment.

13. A wireless communication system comprising:

a first transceiving system including an antenna and a translator system having as an input first RF signals located in a first wireless communication frequency band and having as an output second RF signals located in a second wireless communication frequency band;

the antenna coupled for transceiving the second RF signals associated with the translator system;

a second transceiving system, remote from the first transceiving system and including a remote antenna for transceiving the second RF signals associated with the base station, the second transceiving system including a translator system having as an input the second RF signals, and operable to output RF signals located in the first wireless communication frequency band.

14. The wireless communication system of claim 13 wherein the second transceiving system further comprises a distribution antenna coupled to the translator system for transceiving the RF signals of the remote antenna system located in the first wireless communication frequency band.

15. The wireless communication system of claim 13 wherein said first and second wireless communication frequency bands are predetermined bands of a frequency spectrum allocated by an authorized entity for wireless communications.

16. The wireless communication system of claim 13 wherein at least one of said first and second wireless communication frequency bands are selected from a group of bands comprising: Cellular 800, DCS 900, unlicensed 900, DCS 1800, PCS 1900, unlicensed PCS, UMTS 1900, UMTS 2100, MDS 2100, MMDS 2500, WCS 2300, unlicensed 2400, MMDS 3500, UNII 5.1 GHz, unlicensed UNII 5.1 GHz, UNII 5.8 GHz, unlicensed UNII 5.8 GHz, and LMDS.

17. The wireless communication system of claim 13 wherein the first wireless communication frequency band is a PCS band and the second wireless communication frequency band is an MMDS band.

18. The wireless communications system of claim 13 wherein said second transceiver system is incorporated within a picocell and

propagates the signals in the first wireless communication frequency band in an area bounded by said picocell.

19. The wireless communication system of claim 13 wherein the second transceiver system is located inside a building.

20. The wireless communication system of claim 13 wherein the signals in the first wireless communication frequency band output by the second transceiver system are configured to be used by customer premises equipment.

21. The wireless communication system of claim 13 wherein said second transceiver system is also operable to provide, as an output, the second RF signals in the second wireless communication frequency band.

22. A wireless communication system comprising:

a base station with an antenna;

a translator system having as an input first RF signals located in a first wireless communication frequency band and having as an output second RF signals located in a second wireless communication frequency band;

the antenna coupled for transceiving second RF signals associated with the translator system;

a remote antenna system including a remote antenna for transceiving the second RF signals associated with the base station, the remote antenna system including a translator system having as an input the second RF signals, and operable to output third RF signals located in third wireless communication frequency band.

23. The wireless communication system of claim 22 wherein the remote antenna system further comprises a distribution antenna coupled to the translator system for transceiving the RF signals of the remote antenna system located in the third wireless communication frequency band.

24. The wireless communication system of claim 22 wherein said first, second and third wireless communication frequency bands are predetermined bands of a frequency spectrum allocated by an authorized entity for wireless communications.

25. The wireless communication system of claim 22 wherein at least one of said first and second wireless communication frequency bands are selected from a group of bands comprising: Cellular 800, DCS 900, unlicensed 900, DCS 1800, PCS 1900, unlicensed PCS, UMTS 1900, UMTS 2100, MDS 2100, MMDS 2500, WCS 2300, unlicensed 2400, MMDS 3500, UNII 5.1 GHz, unlicensed UNII 5.1 GHz, UNII 5.8 GHz, unlicensed UNII 5.8 GHz, and LMDS.

26. The wireless communication system of claim 22 wherein the signals in the third wireless communication frequency band output by the remote antenna system are configured to be used by customer premises equipment.

27. The wireless communication system of claim 22 wherein said remote antenna system is also operable to provide, as an output, the second RF signals in the second wireless communication frequency band.

28. The wireless communication system of claim 22 wherein said remote antenna system is also operable to output RF signals located in the first wireless communication frequency band.

29. An antenna system for communication in a wireless communication system, the antenna system comprising:

antenna elements defining a plurality of different beams for the antenna system, the plurality of beams being directed in a plurality of different directions for transceiving signals is a plurality of directions;

switching circuitry for selectively switching between the different beams of the antenna elements depending on the strength of a signal associated with the beams.

30. The antenna system of claim 29 further comprising a mounting structure supporting the antenna elements in a plurality of different directions, the supporting structure configured for being mounted in an attic space of a building.

31. The antenna system of claim 29 wherein said antenna elements include a plurality of antenna arrays, each array defining at least one beam.

32. The antenna system of claim 29 further comprising a translator system coupled to said antenna elements to receive, as an input from said antenna elements, RF signals located in one wireless communication frequency band, the translator system operable to output RF signals located in another wireless communication frequency band.

33. The antenna system of claim 32 wherein at least one of said one and another wireless communication frequency bands are selected from a group of bands comprising: Cellular 800, DCS 900, unlicensed 900, DCS 1800, PCS 1900, unlicensed PCS, UMTS 1900, UMTS 2100, MDS 2100, MMDS 2500, WCS 2300, unlicensed 2400, MMDS 3500, UNII 5.1 GHz, unlicensed UNII 5.1 GHz, UNII 5.8 GHz, unlicensed UNII 5.8 GHz, and LMDS.

34. The antenna system of claim 32 further comprising a distribution antenna coupled to the translator system for transceiving the output RF signals located in the another wireless communication frequency band.

35. The antenna system of claim 29 further comprising a wireless hub.

36. A method for increasing capacity in a wireless communication system, the method comprising:

translating RF signals between first RF signals located in a first wireless communication frequency band and second RF signals located in a second wireless communication frequency band;

transceiving the second RF signals at a base station;

transceiving the second RF signals with a remote antenna system located away from the base station;

at the remote antenna system, translating RF signals between said second RF signals and RF signals located in the first wireless communication frequency band.

37. The method of claim 36 further comprising transceiving the translated RF signals in the first wireless communication frequency band at the remote antenna system and communicating with customer premises equipment in the first wireless communication frequency band.

38. The method of claim 36, wherein said first and second wireless communication frequency bands are predetermined bands of a frequency spectrum allocated by an authorized entity for wireless communications.

39. The method of claim 38 wherein at least one of said first and second wireless communication frequency bands are selected from a group of bands comprising: Cellular 800, DCS 900, unlicensed 900, DCS 1800, PCS 1900, unlicensed PCS, UMTS 1900, UMTS 2100, MDS 2100, MMDS 2500, WCS 2300, unlicensed 2400, MMDS 3500, UNII 5.1 GHz, unlicensed UNII 5.1 GHz, UNII 5.8 GHz, unlicensed UNII 5.8 GHz, and LMDS.

40. The method of claim 36 further comprising mounting the remote antenna within a premises and transceiving the translated RF signals in the first wireless communication frequency band within the premises.

41. The method of claim 36 further comprising mounting the remote antenna within a picocell and transceiving the translated RF signals in the first wireless communication frequency band within the picocell.

42. The method of claim 36 further comprising transceiving untranslated RF signals in the second wireless communication frequency band at the remote antenna system and communicating with customer premises equipment in the second wireless communication frequency band.

43. The method of claim 42 further comprising communicating with customer premises equipment through a wireless hub.

44. A method for increasing capacity in a wireless communication system, the method comprising:

translating first RF signals located in a first wireless communication frequency band to second RF signals located in a second wireless communication frequency band;

transceiving the second RF signals at a base station;

transceiving the second RF signals with a remote antenna system located away from the base station;

at the remote antenna system, translating said second RF signals to RF signals located in a third wireless communication frequency band.

45. The method of claim 44 further comprising transceiving the translated RF signals in the third wireless communication frequency band at the remote antenna system and communicating with customer premises equipment in the third wireless communication frequency band.

46. The method of claim 44, wherein said first, second and third wireless communication frequency bands are predetermined bands of a frequency spectrum allocated by an authorized entity for wireless communications.

47. The method of claim 46 wherein at least one of said first, second and third wireless communication frequency bands are selected from a group of bands comprising: Cellular 800, DCS 900, unlicensed 900, DCS 1800, PCS 1900, unlicensed PCS, UMTS 1900, UMTS 2100, MDS 2100, MMDS 2500, WCS 2300, unlicensed 2400, MMDS 3500, UNII 5.1 GHz, unlicensed UNII 5.1 GHz, UNII 5.8 GHz, unlicensed UNII 5.8 GHz, and LMDS.

48. A method of communicating in a wireless communication system comprising:

defining a plurality of different beams with an antenna system, the plurality of beams being directed in a plurality of different directions for transceiving signals is a plurality of directions;

selectively switching between the different beams of the antenna elements depending on the strength of signals associated with the beams.

49. The method of claim 48 further comprising mounting the antenna system in an attic space of a building.

50. The method of claim 48 further comprising defining the plurality of beams with a plurality of antenna arrays, each array defining at least one beam.

51. The method of claim 48 further comprising transceiving RF signals which are located in one wireless communication frequency band and translating those signals to RF signals located in another wireless communication frequency band.

52. The method of claim 51 wherein at least one of said one and another wireless communication frequency bands are selected from a group of bands comprising: Cellular 800, DCS 900, unlicensed 900, DCS 1800, PCS 1900, unlicensed PCS, UMTS 1900, UMTS 2100, MDS 2100, MMDS 2500, WCS 2300, unlicensed 2400, MMDS 3500, UNII 5.1 GHz, unlicensed UNII 5.1 GHz, UNII 5.8 GHz, unlicensed UNII 5.8 GHz, and LMDS.

53. A method for increasing the effective capacity in a wireless communication system, the method comprising:

translating in a modified legacy base station first RF signals in a first wireless communication frequency band to second RF signals located in a second wireless communication frequency band;

transmitting said second RF signals to a remote antenna system;

translating, at the antenna system, said second RF signal to RF signals back into the first wireless communication frequency band.

54. The method of claim 53 further comprising transmitting, at said remote antenna system, said RF signal in said first wireless frequency band to CPE.

55. A method for increasing the effective capacity in a wireless communication system, the method comprising:

translating in a modified legacy base station first RF signals in a first wireless communication frequency band to second RF signals located in a second wireless communication frequency band;

transmitting said second RF signals to a remote antenna system;

translating, at the antenna system, said second RF signal to RF signals into a third wireless communication frequency band.